

We Claim:

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1. A method for transcutaneous immunization comprising:
 - (a) providing a formulation comprised of at least one antigen and at least one adjuvant,
 - (b) applying said formulation epicutaneously to skin of an organism without penetrating past dermis of said skin, and
 - (c) inducing an antigen-specific immune response in said organism.
2. A method of claim 1, wherein the antigen-specific immune response is enhanced as compared to a formulation that does not contain the adjuvant.
3. A method of claim 1 further comprising processing the antigen by at least one antigen presenting cell (APC), wherein at least an immunogenic epitope of said antigen is presented by the APC.
4. A method of claim 3, wherein the APC is a Langerhans cell.
5. A method of claim 1 further comprising activating at least one antigen presenting cell (APC) with the adjuvant.
6. A method of claim 5, wherein the APC is a Langerhans cell.
7. A method of claim 1 further comprising inducing an increase in antigen presenting cells (APCs) at the formulation's site of application.
8. A method of claim 7, wherein the APCs are Langerhans cells.
9. A method of claim 1 further comprising hydrating the skin.
10. A method of claim 7, wherein hydration enhances the antigen-specific immune response as compared to application of the formulation without hydration.

11. A method of claim 1, wherein a physical, chemical, electrical, or sonic penetration enhancer is not involved in application of the formulation.

12. A method of claim 1, wherein the formulation does not include a penetration enhancer, viral particle, liposome, proteosome, or chemical transfectant.

13. A method of claim 1, wherein an allergic or atopic reaction is not induced.

14. A method of claim 1, wherein the antigen and the adjuvant are separate components of the formulation.

15. A method of claim 1, wherein the organism is a human and induction of the antigen-specific immune response provides a prophylactic treatment.

16. A method of claim 1, wherein the organism is a human and induction of the antigen-specific immune response provides a therapeutic treatment.

17. A method of claim 1, wherein the organism is an animal and induction of the antigen-specific immune response provides a prophylactic treatment.

18. A method of claim 1, wherein the organism is an animal and induction of the antigen-specific immune response provides a therapeutic treatment.

19. A method of claim 1, wherein the antigen has a molecular weight greater than 1000 daltons.

20. A method of claim 1, wherein the antigen has a molecular weight greater than 2500 daltons.

21. A method of claim 1, wherein the antigen has a molecular weight greater than 5000 daltons.

22. A method of claim 1, wherein the antigen has a molecular weight greater than 10,000 daltons.

23. A method of claim 1, wherein the antigen is proteinaceous and has a molecular weight greater than 2500 daltons.

24. A method of claim 1, wherein the antigen is proteinaceous and has a molecular weight greater than 5000 daltons.

25. A method of claim 1, wherein the antigen is proteinaceous and has a molecular weight greater than 10,000 daltons.

26. A method of claim 1, wherein the antigen-specific immune response recognizes at least one pathogen.

27. A method of claim 26, wherein the pathogen-specific immune response provides at least some protection for the immunized organism against infection by the pathogen as compared to a non-immunized organism.

28. A method of claim 1, wherein the organism is a human.

29. A method of claim 28, wherein the antigen-specific immune response recognizes at least one pathogen and provides at least some protection for the immunized human against infection by the pathogen as compared to a non-immunized human.

30. A method of claim 1, wherein the induced immune response recognizes at least one surface antigen of a pathogen.

31. A method of claim 1, wherein the induced immune response recognizes at least one antigen of a pathogen.

32. A method of claim 31, wherein the pathogen is a bacterium.

33. A method of claim 31, wherein the pathogen is a virus.

34. A method of claim 31, wherein the pathogen is a fungus.

35. A method of claim 31, wherein the pathogen is a parasite.

36. A method of claim 1, wherein the induced immune response recognizes at least one protein antigen of a pathogen.

37. A method of claim 1, wherein the induced immune response recognizes at least one carbohydrate antigen of a pathogen.

38. A method of claim 1, wherein the induced immune response recognizes at least one glycolipid antigen of a pathogen.

39. A method of claim 1, wherein the induced immune response recognizes at least one glycoprotein antigen of a pathogen.

40. A method of claim 1, wherein the induced immune response recognizes at least one lipoprotein antigen of a pathogen.

41. A method of claim 1, wherein the antigen is provided in whole cell form selected from the group consisting of live microbes, attenuated microbes, and inactivated microbes.

42. A method of claim 1, wherein the antigen is provided in a viral particle or virion form selected from the group consisting of live viruses, attenuated viruses, and inactivated viruses.

43. A method of claim 1, wherein the antigen is provided in a whole-cell form selected from the group consisting of live bacteria, attenuated bacteria, and inactivated bacteria.

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44. A method of claim 1, wherein the antigen is provided in a cell-free form.

45. A method of claim 1, wherein the antigen is provided as at least one polynucleotide which encodes at least the antigen.

46. A method of claim 1, wherein the antigen is provided as at least one plasmid which encodes at least the antigen.

47. A method of claim 1, wherein the induced immune response recognizes an autoantigen.

48. A method of claim 47, wherein the autoantigen-specific immune response provides treatment for at least one autoimmune disease or other autoimmune condition.

49. A method of claim 1, wherein the induced immune response recognizes a human autoantigen.

50. A method of claim 1, wherein the induced immune response recognizes a tumor antigen.

51. A method of claim 50, wherein the tumor antigen-specific immune response provides treatment for at least one neoplastic disease or other neoplastic condition.

52. A method of claim 1, wherein the induced immune response recognizes a human tumor antigen.

53. A method of claim 1, wherein the induced immune response recognizes an allergen.

54. A method of claim 53, wherein the allergen-specific immune response provides treatment for at least one allergy or other allergic condition.

55. A method of claim 1, wherein the adjuvant has a molecular weight greater than 1000 daltons.

56. A method of claim 1, wherein the adjuvant has a molecular weight greater than 2500 daltons.

57. A method of claim 1, wherein the adjuvant has a molecular weight greater than 5000 daltons.

58. A method of claim 1, wherein the adjuvant has a molecular weight greater than 10,000 daltons.

59. A method of claim 1, wherein the adjuvant is proteinaceous and has a molecular weight greater than 2500 daltons.

60. A method of claim 1, wherein the adjuvant is proteinaceous and has a molecular weight greater than 5000 daltons.

61. A method of claim 1, wherein the adjuvant is proteinaceous and has a molecular weight greater than 10,000 daltons.

62. A method of claim 1, wherein the adjuvant is at least an ADP-ribosylating exotoxin.

63. A method of claim 62, wherein the ADP-ribosylating exotoxin is genetically modified to be less toxic to the organism than non-modified ADP-ribosylating exotoxin.

64. A method of claim 1, wherein the adjuvant is at least a cholera toxin.

65. A method of claim 1, wherein the adjuvant is at least a pertussis toxin.

66. A method of claim 1, wherein the adjuvant is at least an *E. coli* heat-labile enterotoxin.

67. A method of claim 1, wherein the adjuvant is at least a *Pseudomonas* exotoxin.

68. A method of claim 1, wherein the adjuvant is at least one pathogen-associated molecular pattern (PAMP).

69. A method of claim 68, wherein the PAMP is a polynucleotide selected from the group consisting of bacterial deoxyribonucleic acids, unmethylated CpG motifs, and double-stranded ribonucleic acids.

70. A method of claim 68, wherein the PAMP is selected from the group consisting of lipopolysaccharides, lipid A, and monophosphoryl lipid A.

71. A method of claim 1, wherein the adjuvant is at least a chemokine or a cytokine.

72. A method of claim 1, wherein the adjuvant is provided in a cell-free form.

73. A method of claim 1, wherein the adjuvant is provided as at least one polynucleotide which encodes at least the adjuvant.

74. A method of claim 1, wherein the adjuvant is provided as at least one plasmid which encodes at least the adjuvant.

75. A method of claim 1, wherein the formulation is applied to the skin for less than three hours.

76. A method of claim 1, wherein the formulation is applied to the skin for less than two hours.

77. A method of claim 1, wherein the formulation is applied to the skin for more than one hour.

78. A method of claim 1 further comprising inducing systemic immunity specific for the antigen.

79. A method of claim 1 further comprising inducing mucosal immunity specific for the antigen.

80. A method for transcutaneous immunization of an organism comprising:
(a) providing a formulation comprised of at least one antigen and at least one adjuvant, wherein enhancement of immunologic activity by said adjuvant is separable from an immunogenic epitope of said antigen;
(b) applying said formulation to skin of said organism; and
(c) inducing an immune response in said organism specific for said immunogenic epitope which is enhanced as compared to a formulation that does not contain said adjuvant activity.

81. A method of claim 80, wherein the induced immune response provides a prophylactic treatment for the organism which is enhanced as compared to a formulation that does not contain said adjuvant activity.

82. A method of claim 80, wherein the induced immune response provides a therapeutic treatment with some beneficial effect for the organism which is enhanced as compared to a formulation that does not contain said adjuvant activity.

83. A method of claim 80, wherein the organism is a human and induction of the antigen-specific immune response provides a prophylactic treatment.

84. A method of claim 80, wherein the organism is a human and induction of the antigen-specific immune response provides a therapeutic treatment.

85. A method of claim 80, wherein the organism is an animal and induction of the antigen-specific immune response provides a prophylactic treatment.

86. A method of claim 80, wherein the organism is an animal and induction of the antigen-specific immune response provides a therapeutic treatment.

87. A method of claim 80, wherein the antigen-specific immune response recognizes at least one pathogen.

88. A method of claim 87, wherein the pathogen-specific immune response provides at least some protection for the immunized organism against infection as compared to a non-immunized organism.

89. A method of claim 87, wherein the pathogen-specific immune response provides at least some therapeutic benefit for the immunized organism for symptoms of infection as compared to a non-immunized organism.

90. A method of claim 80, wherein the organism is a human.

91. A method of claim 90, wherein the antigen-specific immune response recognizes at least one pathogen and provides at least some protection for the immunized human against infection as compared to a non-immunized human.

92. A method of claim 90, wherein the antigen-specific immune response recognizes at least one pathogen and provides at least some therapeutic benefit for the immunized human for symptoms of infection as compared to a non-immunized human.

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93. A formulation which comprises:

- (a) at least one antigen, and
- (b) at least one adjuvant;

wherein enhancement of immunologic activity by said adjuvant is separable from an immunogenic epitope of said antigen, and said formulation induces an immune response

specific for said immunogenic epitope which is enhanced as compared to a formulation that does not contain said adjuvant activity

94. A formulation of claim 93, wherein the formulation is packaged in a form selected from the group consisting of cream, emulsion, gel, lotion, ointment, paste, and suspension.

95. A formulation of claim 93 further provided in a container suitable for immersion or spraying.

96. A formulation of claim 93, wherein the formulation consists essentially of molecules, any one of which has both the adjuvant activity and the immunogenic epitope.

97. A formulation of claim 93, wherein the formulation consists essentially of molecules, any one of which has either the adjuvant activity or the immunogenic epitope.

98. A formulation of claim 93, wherein the formulation consists essentially of the adjuvant activity and the antigen.

99. A formulation of claim 93, wherein the formulation is packaged in a unit dosage form which is effective to provide some beneficial immunologic treatment.

100. A formulation of claim 93, wherein the formulation is at least a therapeutic vaccine which provides treatment for symptoms of an infection.

101. A formulation of claim 93, wherein the formulation is at least a prophylactic vaccine which provides treatment to prevent an infection.

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